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PRE-PHASE 2 PRESENTATION ON A CLEAN, SUPPRESSED-RADIATION ATOMIC DEMOLITION MUNITION

(Title: ~~Secret Restricted Data~~)

Peter H. Moulthrop

September 1, 1965

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PREFACE

This report and its two companion documents* record the information presented by LRL at the pre-Phase 2 meeting for the Advanced Nuclear Demolition Munition, which was held at Albuquerque, New Mexico, on August 17, 1965. The concept described here represents the work of many individuals and groups in LRL and Sandia Corporation, Livermore Laboratory; Exemption 6 should be mentioned by name.

X6

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*Exemption 6 "Fission Explosives for Atomic Demolition Munition Applications," Lawrence Radiation Laboratory, Livermore, California, Report UCRL-14410, September, 1965 (title Unclassified, Report SRD); and LRL Military Applications Group, "Atomic Demolition Munitions: Uses, Constraints, and Technology," Lawrence Radiation Laboratory, Livermore, California, Report UCRL-14409, September, 1965 (title Unclassified, report SRD).

PRE-PHASE 2 PRESENTATION ON A CLEAN, SUPPRESSED-RADIATION ATOMIC DEMOLITION MUNITION

Peter H. Moulthrop

Lawrence Radiation Laboratory, University of California
Livermore, California

September 1, 1965

Introduction

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A weapon of this type could meet the principal ADM design goals of minimum fallout, minimum weight, minimum cost, and easily adjustable total yield.

This concept was discussed at the pre-Phase 2 meeting on the Advanced Nuclear Demolition Munition (AND). This report gives essentially the information on the concept as presented by LRL at that meeting.

Design

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These yields essentially cover the range now offered by the MK 45 and MK 54 ADM's.

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Attachment would be by simple, clip-on fasteners.

Table I summarizes the features of the proposed design shown in Figure 1.

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DOE b(3) DELETED Whether such an option is of value may be open to question, but its availability should be mentioned.

Weights, dimensions, costs, and yields listed in the table are being modified as a result of discussions at the meeting. The Phase 2 document, to be published later this year by Field Command, Defense Atomic Support Agency, will supersede Table I and other parts of this report, and should be consulted when it becomes available.

Table II lists data on the significant, full-scale, SR development tests conducted to date. These successful tests underlie the LRL proposal; more tests will be needed to develop a stockpile item.

Table II. Results of full-scale SR development tests.

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Fallout

The Army's Qualitative Material Requirement for AND* defines cleanliness in terms of fallout area from a surface burst. Using the data from 18 surface shots, Keizur** finds that in the range from 0.1 to 5000 R/hr, the radiation intensity per kt at

*"Department of the Army Approved Qualitative Material Requirement for Advanced Nuclear Demolition," HQ USACDC, 6948, October, 1964 (SRD).

**Exemption 6 "The Extent of Close-in Fallout from an Underground Nuclear Burst," Sandia Corporation, RS-3410/154, December, 1964 (SRD).

1 hr after burst (H + 1) for an all-fission device is $I = 37.2A^{-0.86}$, where I is the intensity in R/hr and A is the area in square miles. The intensity from an SR device will be down by the ratio of its fission† yield to its total yield. Or, if an SR device is compared to a fission device, the area ratio will be the intensity ratio to the 1.16 power.

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For an underground burst, the area ratios will be slightly greater, both because (1) as Keizur finds, the intensity vs area curve is steeper, presumably because of the lower cloud height, and (2) because all escaping neutrons are captured in dirt, in contrast to a surface burst, where most are captured in air (producing C^{14}).

A feature of the downwind fallout from an SR burst that has not been previously discussed is its lesser dependence on wind velocity compared to the fallout from an all-fission burst. This point, illustrated in Fig. 2 would simplify the task of fallout prediction by reducing its dependence on meteorological data.

Economics

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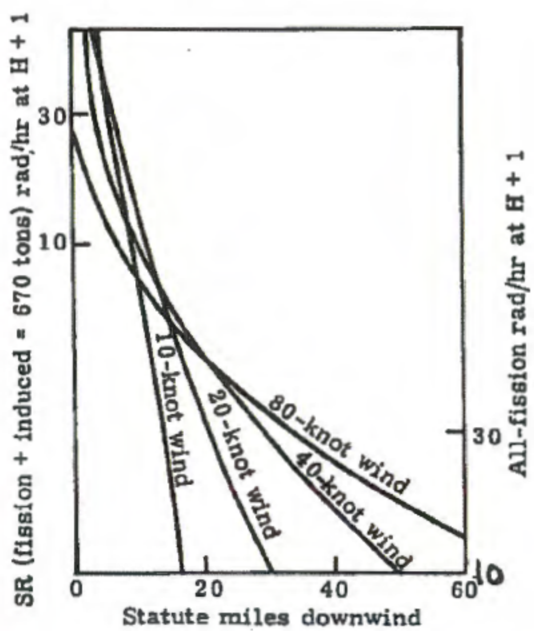

Fig. 2. Comparison of downwind fallout intensity for 10-kt SR and all-fission surface bursts.

† Plus an additional contribution from induced activity.

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